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THE TREATMENT OF THE ACUTE STAGE OF POLIO-MYELITIS FROM THE NURSES' STANDPOINT

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Diet. Most of our patients required more than the normal amount of food and were very insistent in their demands that they should have it. It may be said truly that they were really hungry, for they would eat anything we gave in the line of food and were always ready for more. They never asked for anything special nor did they refuse anything offered them. Thus they would eat cereal without sugar, eggs without salt, bread without butter, etc. So different was the appetite of these children from the fastidious appetites of the convalescents of other acute contagious diseases, that we could not help being impressed by it. We considered it as probably due to nature's effort to obtain an equilibrium between tissue construction and tissue destruction, for wasting is very early, rapid, and progressive, in the paralyzed parts in poliomyelitis. The routine diet for the febrile stage consisted of milk for the first three or four days, then bread and cereal were added, and after the seventh day the child was given a full diet consisting of everything but meat. The soup used was made with less meat and more vegetable juice than is usual, and once a day the children were given apple sauce or prunes. There is practically no danger in giving a full diet early in the disease, as nephritis is an almost unknown complication.

S. Symptomatic treatment. Constipation was often an exceedingly difficult problem to handle, especially in the older patients. A mild laxative was usually effective in the case of the children, and for this purpose milk of magnesia was employed with satisfactory results. In the adults and also in the older children, more drastic measures were required and here calomel followed by magnesium sulphate was employed, but even this treatment proved to be ineffective in some of the more severe cases and high saline enemata at frequent intervals were necessary to prevent fecal impaction in the lower bowel. In fact, colonic irrigations may be used with advantage during the first week of the disease and should be repeated thereafter as needed. A mixed diet, containing plenty of vegetables and fruit juice, should be resorted to, in addition to other treatment. The prominence of con-

stipation in the symptomatology of poliomyelitis is due to the frequency of paralytic involvement of the abdominal muscles and occasionally to a paresis of the nerves supplying the muscular layers of the intestinal wall.

In the treatment of the patient during the first few days of the disease, it is important to remember that the first therapeutic measure employed by the nurse should be the administration of a good full dose of an active cathartic, such as magnesium sulphate, calomel, or castor oil. This should be given in order to prevent the possible absorption of the causative agent of the disease or its toxin from the intestinal tract.

Intercostal and diaphragmatic paralysis. Paralysis of the intercostal muscles and of the diaphragm are extremely frequent and give rise to symptoms of much gravity. In no other disease of childhood should the nurse watch the respiratory excursion so carefully as in poliomyelitis, and any change in the type of breathing, either in that it becomes more rapid, more shallow, or more labored, should always be considered a danger signal. The temperature may be slightly or not at all elevated, the pulse rate only a little increased and yet the patient may be at death's door, suffering from a respiratory paralysis. Paralysis of both of these muscles results almost invariably in a fatal termination, as the patient's respirations then practically cease and the vital functions of life cannot be carried on. Such a paralytic involvement occurs in the bulbar types of the disease, and with few exceptions death occurs in the first, or early part of the second, week. Recovery may ensue however in cases where the intercostals are completely paralyzed, but the diaphragm is only slightly affected, as respiration may then be carried on to a sufficient extent to maintain life, until the paralysis improves. If the intercostal muscles are paralyzed, but the diaphragm is normal, the breathing will be entirely abdominal or diaphragmatic. Respiratory cases are all characterized by cyanosis of some degree, which shows itself in the skin and the mucous membranes. In treating these cases, we found that oxygen gas was of considerable value. It was given best by means of Dr. Meltzer's apparatus for giving oxygen under pressure. This apparatus differs somewhat from the funnel method of administration of oxygen, in that it is provided with a rubber bag reservoir for the oxygen, connected with the tank of gas by rubber tubing and by means of another tube with a stop-cock regulating a valve which can be opened and closed at a definite rate per minute, so as to coincide with inspiration and expiration; the arrangement being such that the valve is opened and oxygen is allowed to flow past it during inspiration, while the valve is

closed and oxygen is shut off during expiration. This stop-cock is connected by a rubber tube with a flat hollow piece of metal which fits into the mouth between the teeth, lying upon the surface of the tongue and affording entrance for the oxygen into the body. The oxygen was given every two or three hours for twenty minutes at a time. Even in the worst cases temporary improvement would almost invariably follow its use, although we cannot claim that any lives were directly saved by its administration alone. Children with respiratory difficulty which does not prove immediately fatal, are extremely irritable and what they most desire is that they be left entirely alone. The nurse will find it a very hard task, indeed an almost impossible one, to make them comfortable, for no matter in what position they are placed, their respiration remains just as labored. Certain positions, however, are distinctly contra-indicated and the one which is most harmful is that of laying the child with face bent downward, on the abdomen and chest, for its mouth and nose are then buried in the pillow, the slight movements of the chest and abdomen are greatly hindered, and if paralysis is so extreme that the child cannot of himself turn on his side nor move his head to the edge of the pillow, he may almost suffocate despite the fact that the nurse is only a short distance away. Most of these children have a low, indistinct voice which is audible only when one stands close to them, and indeed they speak very little, as they seem instinctively to realize that all their energy must be conserved for breathing purposes. For a similar reason, feeding them is much more difficult than in the ordinary case, and wasting of the paralyzed parts appears especially early. Bronchopneumonia is most apt to develop in the respiratory cases and no more serious complication could occur, for the already embarrassed respiration becomes still more labored, the child finds expectoration difficult or impossible, and a fatal outcome is to be expected. Therefore all possible efforts should be used to avoid this complication by keeping the patient out of drafts, keeping him comfortably clothed, and isolating pneumonia cases as soon as they appear in the ward. Should symptoms of pneumonia appear, however, the treatment is that usually employed for this condition in other diseases, but it should be said that fresh air treatment must be employed very cautiously at times when a strong wind is blowing. If treated outdoors the children should be placed in a sheltered position, and the treatment is best carried out in mild, calm weather. The effect of the wind may be somewhat neutralized by a sheet pinned along either side of the crib to a sufficient height. The development of bronchitis is a serious thing in such cases and bronchopneumonia is very apt to follow. We

have found the use of sinapisms of mustard to the anterior and posterior chest, the most effective measure for this latter complication.

Paralysis of deglutition. In bulbar cases, the muscles of the pharynx and sometimes of the esophagus, are rather frequently involved. Most of these patients die, but if death does not occur by the end of the second week of the disease, recovery usually ensues, therefore the maintenance of the processes of resistance by the artificial introduction of food is of great importance. Where, in addition to the involvement of the muscles of swallowing, there was marked respiratory difficulty, we have found feeding by nutrient rectal enemata superior to the use of a stomach tube, especially if struggling occurs with the introduction of the tube. The nutrient enemata are given at six-hour intervals and should contain about eight ounces for a feeding. If the dysphagia persists for more than 5 or 6 days, it is perhaps best to alternate every other day rectal alimentation and gastric gavage. Should the rectum become irritated and expel the enema, gavage will then have to be employed exclusively.

Retention of urine. This was rather unusual in younger children but was met with not infrequently in those between the ages of seven and fourteen years and in the adult patients. In children, retention usually yielded to palliative measures, such as fomentations over the abdomen and vulva, a warm drink, a warm tub bath and suggestion. If these measures proved unsuccessful, and catheterization were required, this was performed by the doctor in charge of the service and not by the nurse. It was only in a few instances found necessary to employ the catheter more than two or three times. In adults, palliative treatment was much less effective and in a few instances catheterization, at intervals of eight hours, had to be repeated for a period of a week or more. Under such circumstances cystitis commonly developed and it was found advisable always to employ urotropin as a preventive.

Incontinence of urine. This was much more frequent than retention. It was, of course, impossible to determine in babies and younger children, but in those past the age of five years, and in the adolescent and adult patients, it was fairly common during the first few weeks of the disease. It was probably due to a temporary paralysis of the nerves supplying the sphincter muscles situated around the neck of the bladder.

Circulatory system. In bulbar cases the peripheral circulation is, as a rule, extremely poor and the extremities are cold and cyanotic. External heat and the use of warm blankets are indicated in such cases though the outlook is usually well near hopeless. Irregularities of the pulse are rather frequent as the temperature subsides, and for several days thereafter, but they have never proved of serious import.

A very slow pulse may also occur at about the same period of the disease. The pulse volume not infrequently is poor, mostly in the more desperately ill children, and we have employed the tincture of strophanthus in most of these cases with satisfactory results. The pulse is an incomparably poorer guide to the child's condition than the respiration and should never be relied on by the nurse in preference to the latter, in judging the child's improvement.

Deformities. Only a few deformities developed during the period the cases were under our observation, for which treatment was required. They were mostly remedied by the application of plaster of Paris casts, with the deformed part in a corrected position.

Delirium. Delirium of any type is relatively rare in poliomyelitis, even when the meningeal symptoms are pronounced, and if it occurs it is almost never of a maniacal character. For this reason there is no need of fearing that the patient will try to get out of bed or do injury to himself or others while in such a condition, but the children may hurt themselves unconsciously by falling out of bed, owing to their helpless, paralytic condition and to prevent this, a board was placed along the entire length of either side of the bed, being secured at the top and bottom.

Gastro-intestinal complication. The most common complications of this type were gastro-enteritis and enterocolitis, the former occurring in very young infants and the latter in bottle-fed babies and younger children. The gastro-enteritis occurring during poliomyelitis is characterized by being extremely rapid in its course and fatal in its outcome, and this despite energetic treatment. The treatment was that usually employed for such a condition, suitable measures being adopted to administer alkaline medication, as an acidosis was not infrequent. One of the most grave danger lies in the fact that the child's body was being depleted of water and not so much in the loss of food. Hence saline solution (isotonic) was given by hypodermoclysis or else by the "mouth drip," recently recommended by Dr. Hess of New York, and this latter method proved serviceable if well taken by the child, which unfortunately was not always the case. The apparatus employed, in thus administering saline by mouth, was exactly similar to that used in giving the Murphy Drip by rectum, except that the mouth piece consisted of a rubber nipple that the baby could suck, and that the fluid used was a slightly sweetened hypotonic saline solution, and was given at the rate of about 30 to 60 drops a minute. Stimulation and external heat were urgently required for these cases as well as the other treatment. Enteritis and enterocolitis were more frequently encountered than gastro-enteritis but luckily proved of not nearly so serious a nature. At the

first appearance of green stools, the child was isolated in a ward especially for these cases. A dose of castor oil was immediately given and all diet was discontinued for from 8 to 12 hours, except some slightly sweetened sterile water. Then the child was placed upon boiled milk or a boiled milk formula and, if over a year in age upon a diet of well-cooked cereal containing a little butter. The cups, dishes, bottles and nipples of these cases were kept strictly for them and were not used for any other children. The nurses exercised great care in washing their hands, especially after changing the diapers, in order to prevent further dissemination of the complication. In a great many cases the stools were so extremely acid that three or four movements would excoriate the buttocks. This was easily remedied, however, by the use of sodium bicarbonate internally, in small doses, and by the application of a solution of the same to the inflamed parts, after which a boric acid or zinc oxide ointment was used. As soon as we noticed this tendency toward inflammation of the skin, the ointments were used at the first appearance of a change in the character of the stool. It was found helpful, also, to pin the diaper loosely so that there was no friction upon the skin surfaces.

Congestion of the bases of the lungs is very apt to occur in cases where the paralysis of the limbs and the trunk is so complete that the child cannot turn on its side. In such cases we found it advisable to turn the child over on the side at frequent intervals, propping the back with pillows so as to maintain this position.

4. *Special and specific treatment.* Various methods of treatment have been used during the present epidemic in an attempt to prevent paralysis supervening or to bring about its cure if it has already developed. All these methods have for their basis a lumbar puncture, followed by the injection of various agents into the spinal canal. Of these latter, normal human serum, convalescent human serum, and normal horse serum are the most important. Normal human serum is obtained from perfectly healthy individuals by withdrawing blood from a vein in the forearm, allowing it to clot, separating the serum, and adding a definite quantity of tricresol as a preservative. Convalescent serum is obtained in a similar way from patients who have had poliomyelitis some months or years previously. Normal horse serum is obtained from strong, healthy horses in the same way as human serum. These serums, whether human or horse, normal or immune, act in a somewhat similar way, that is, by a slight irritant action upon the meninges of the brain and cord, they produce an increase in the polymorphonuclear cells in the cerebrospinal fluid, tending in this way to bring about an earlier termination of the poliomyelitic infection than might otherwise occur. It is possible that convalescent serum

may have in addition, a specific action by containing some immune bodies.

The serum is injected after the spinal fluid has been removed by puncture. The amount of serum given is always less than the quantity of spinal fluid withdrawn, and is never more than 20 c. c. at one time. The injections may be repeated for several consecutive days. As the acute stage of poliomyelitis is usually accompanied by a considerable increase over the normal in the quantity of cerebrospinal fluid in the subarachnoid space of the spinal cord and in the ventricles of the brain, and since this gives rise to pressure symptoms, such as headache, drowsiness, stupor, etc., lumbar puncture, even independent of the use of serum, is of great efficacy in the treatment of the disease. By its performance we lessen the quantity of spinal fluid and hence relieve the symptoms of pressure, and also, we may influence favorably the paralysis. The nurse should therefore realize that although this procedure is slightly painful to the child, it is one of the most important parts of the treatment.

In making a lumbar puncture followed by the intraspinal administration of serum, the sterility of the technique depends so much upon the nurse that we shall speak of it in detail. Preparation for this procedure must be carried out with the same care as for a major operation, because accidental infection of the meninges with a pus-producing organism is a very fatal thing, and one which should never occur owing to faulty technique. The instruments used in the operation should be carefully sterilized. They include a long, thick, strong, steel needle fitted with a stilette, a serum container, a sterile test tube, and a cork to fit. The nurse should be sure the lumen of the needle is clear, and in boiling, the stilette should be withdrawn from the needle, and boiled separately. It is best to wrap all the above articles in gauze before boiling, so as to prevent singeing the rubber tube connections of the serum container by contact with the heated surfaces of the sterilizer. The bottle of serum should be immersed in a basin containing some water heated to about 106 degrees, Fahrenheit, and the temperature should be maintained at a little above that of the body, until used, by adding small quantities of warm water to the water in the basin. A 1-1000 solution of bichloride should be in readiness for the operator to use in disinfecting his hands, and he should be provided with a sterile towel and a pair of gloves. Great care should be taken in preparing the lumbar region of the back, especially as the skin of this part of the body is sometimes soiled with fecal discharges, more especially in younger children. Hence it is advisable to cleanse first with tincture of green soap and warm water, then with alcohol, and finally

to paint with tincture of iodine. In painting, a line should be drawn between the highest points of the iliac crests and around this a square extending two inches on either side of the spinal column and two inches above and below the line from the crest, should be painted. By this simple method the operator is enabled to locate his landmark, because the highest point of the crest is opposite the spine of the fourth lumbar vertebrae, which is also the level for the introduction of the needle. It is advisable to have a few sterile towels which can be used to cover the parts of the body immediately bordering the field of operation. The proper position for the child is the lateral, prone, with the back toward the operator, the child's head to his left. In order to properly hold the patient, one hand should be placed over the neck and the other under the knees, and the two parts approximated as much as possible. This position of flexion may be relaxed as soon as the needle has found fluid. If serum is to be given, there should be at least two nurses present, one retaining her hold upon the child to prevent any sudden movement, while the other prepares the serum for use by passing the top of the bottle and the cork several times through the flame of an alcohol lamp, in order to insure sterility. The cork should then be removed and the serum poured into the container which the doctor holds. This nurse may then occupy herself with noting the patient's condition during the injection of the serum, being careful to call attention to any change in the color and pulse that may occur. After the needle is removed, the wound should be covered with sterile gauze and an adhesive strapping should be firmly applied. If there is any uncertainty about the dressing remaining in place, it is best to support it with a binder. The use of collodion for sealing the wound is objectionable if other punctures are to be made.

THE RED CROSS PARADE

All who saw the Red Cross parade in New York City on October 4, agree that it was a beautiful and impressive sight. It was a visible demonstration of the multitude of women enrolled through the Red Cross for their country's service, in one branch or another, in this locality. It could undoubtedly be duplicated in almost any of the working centres of the country in proportion to the population. The awakened and patriotic towns and smaller cities are doing as well or better than the larger ones.